

►►► APPENDIX I FORECAST ACCURACY

Forecasts, by their nature, have a degree of uncertainty incorporated in them. They involve not only statistical analyses and various scientific methods, but also judgment, and reliance on industry knowledge and the forecaster's experience to incorporate industry trends not yet reflected in recent results. The FAA's annual Aerospace Forecast is no exception. Given the volatile nature of the U.S. airline industry, it is not surprising that each year's forecast would contain a certain degree of forecast variance. Therefore, FAA forecasters have tried to build forecast models that give a consistent and predictable pattern of results. Analysts relying on the forecasts produced by the models would then be able to adjust for the predictable variance from actual results.

The table below presents an analysis of the variance from historical results for five key forecast metrics during the FY 2003–FY 2007 forecast period. Although this brief period has experienced industry upheaval, FAA's forecast methodology remained consistent during this time. For these reasons, inclusion of prior periods in an analysis of forecast variance might lead to inconclusive, or inaccurate, implications about the accuracy of FAA's current forecast methodology.

The table contains the weighted average forecast errors expressed in percentage terms of the projected values versus the eventual results for U.S. carriers' domestic operations. Each metric has five values showing the relative forecast variance by the number of years in advance the preparation of the forecast took place. For example, the 3 Years column for ASM shows the average forecast error was 6.0 percent for ASM forecasts prepared 3 years in advance. For the period under examination, preparation of the forecasts for FY 2005, FY 2006 and FY 2007 occurred in FY 2003, FY 2004 and FY 2005, respectively.¹

¹ It should be noted that the first forecasted year for each respective fiscal year is that very same year. Therefore, FY 2003's first forecasted year is FY 2003, and the third forecasted year is FY 2005. This also means that the 5 Years column in the table above consists of only one observation point, while the 4 Years column is based upon two observations.

**U.S. AIR CARRIERS
DOMESTIC SCHEDULED PASSENGER OPERATIONS
FORECAST EVALUATION**

Forecast Variable	Forecast Percent Error (Combined FY 2003 - FY 2007)				
	(Forecast Greater/Less than Actual)				
	Forecast Performed Years Prior to Actual				
	1 Year	2 Years	3 Years	4 Years	5 Years
ASM	0.2%	2.9%	6.0%	7.8%	6.1%
RPM	-1.5%	-1.5%	-1.5%	-2.0%	-4.7%
Pax Enplanement	-0.4%	0.5%	1.5%	3.1%	1.7%
Mainline Pax Yield	0.2%	1.5%	2.5%	4.5%	8.4%
IFR Aircraft Handled	-0.1%	1.1%	2.4%	3.2%	2.7%

Presenting forecast variances in such a manner simplifies a review of longer-term trends. Typically, one would expect the variances to decline as the forecast year draws closer to the year the forecast is prepared. In addition, presenting forecast variance in this way allows an examination of changes in the relative variances by time horizon, signaling when dramatic shifts in accuracy occur. Finally, it also shows whether forecast values are greater or lower than actual results.

Examination of the forecast variance reveals several noteworthy items. First, all the metrics examined show declining variances as the forecast time horizon decreases, as expected. For both Yield and ASMs there are steady declines in variance from Year 4 through Year 1. The largest decreases come in the Year 3 and Year 1 periods for Yield, and in the Year 2 and Year 1 periods for ASMs. Second, the FAA's forecast model produces relatively small variances for both of the passenger traffic metrics, Enplanements and RPMs, as well as IFR aircraft handled (less than 3.5 percent for any forecast time horizon examined except for the 5-Year time horizon for RPMs).

Third, there is no improvement in forecast accuracy for RPMs within the Year 3 time horizon. Fourth, the relative divergence in forecast variances between RPM and Enplanements, and between RPMs and ASMs, suggests errors in forecasting both passenger trip lengths and load factor.

The examination of the forecast variances over time suggests three primary implications. First, added focus on passenger trip length in the forecasting process – as passenger trip length is the linchpin between RPM and Enplanements – might help improve the forecast model's robustness. Specifically, by directly incorporating trip length estimation into its forecast model FAA believes a reduction in the divergence in annual variations between RPM and Enplanements can occur.

Second, additional focus on load factor might improve the model. Currently, load factor is calculated by dividing the forecast RPMs by forecast ASMs. The large difference between the RPM forecast variance and ASM forecast variance indicates a consistent underestimation of load factor, one of the critical elements in converting passenger demand into aviation activity. All other things being equal, a consistent underestimation of load factor will lead to long-term forecasts of aviation activity that are too high.

Furthermore, ASMs are becoming increasingly difficult to forecast beyond a relatively short time horizon, as carriers often react to changing market conditions. The consistent overestimation of ASMs suggests that carriers have reacted by pulling down capacity. Such capacity reductions can be identified in the short term by using advance schedule information. However, FAA's longer-term forecasts rely on anticipated aircraft deliveries and retirements as well as historic relationships between economic activity and capacity deployed. Given the volatile nature of many of the factors that may influence longer term ASM forecasts, a simpler approach, such as RPMs divided by load factor, may improve the long run accuracy of the ASM forecasts.